Space Weather Forecast

Issued on Saturday, 14 September 2024 at 13:21 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Further Moderate flares likely with a slight chance of Strong flares. Chance of G1-G2 Minor to Moderate storms with Coronal Mass Ejection arrivals possible on Day 1 (14 Sep) and Day 3 (16 Sep).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High activity with a peak low-level Moderate flare at 14/0741 UTC from a moderately large region in the southeast, as well as numerous Moderate flares from this region and other regions at, or just over the western limb.

There are eight sunspot regions on the visible disc, including one unnumbered region in the south centre disc. The region in the southeast continued to rotate into clearer view and indicated notable magnetic complexity including and significant magnetic looping in coronagraph imagery. A number of sunspots are approaching the southwestern limb and becoming increasingly foreshortened in coronagraph imagery. Generally though, these regions appear to be stable and in decay. Slight proliferation of intermediate spots was observed in a sunspot group near centre disc in the southern hemisphere. The remaining regions are generally small, with limited magnetic complexity and activity at this time.

A Coronal Mass Ejection (CME) that was observed at, or close to the southwest limb, emerging around 14/0300 UTC is awaiting modelling to determine if there is any Earth-directed component. Numerous other CMEs were observed but these are not deemed to be Earth-directed.

Solar Wind / Geomagnetic Activity: Solar wind parameters were indicative of the waning influence of the Coronal Mass Ejection (CME) that arrived at Earth on 12 Sep. Solar wind speeds were quite erratic but reduced from 450-500 km/s to 370-420 km/s. The Interplanetary Magnetic Field (IMF) Bt, was Weak to Moderate, but the important north-south component, Bz, remained largely negative, reaching -9nT between 13/1930-2130 UTC. The net result of these parameters was for mostly Unsettled to Active geomagnetic activity, but with a G2 Moderate storm interval between 13/0000-0300 UTC and a Quiet interval from 14/0600-0900 UTC.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was steady at background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate to High activity is expected, with further Moderate flares likely, and a slight chance of Strong flares. These most likely from the moderately large sunspot group in the southeast.

Solar Wind / Geomagnetic Activity: Solar winds are between slightly elevated and background levels following the CME arrival on 12 Sep. There are two further CME arrivals in the forecast - first one on Day 1 (14 Sep), although low confidence and yet to arrive. The second a potential glancing impact on Day 3 (16 Sep) - plus the potential onset of fast solar winds on Days 2 and 3 (15 and 16 Sep).

On Day 1 (14 Sep) geomagnetic activity is expected to be Quiet to Active, with a chance of peak

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G1 Minor Storm conditions should any CME impact from late 10 Sep CME occur. Mostly Quiet to Unsettled activity is expected by Day 2 (15 Sep), then generally Unsettled to Active conditions on Day 3 (16 Sep) with isolated G1 Minor Storm intervals possible. Activity should subside to Quiet and Unsettled levels by Day 4 (17 Sep).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) has a chance to rise, mainly given any further strong flares and eruptions from the southwest disc. This brings a slight chance of exceeding the S1 Minor Radiation Storm level, although this risk recedes later in the period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	Yes	40	5	30	5
Strong	G3	No	5	1	5	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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